

Captains of Fate and the Four Dimensions of Safety

By Tony Cortés
HQ USAF Safety Center
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Every morning starts the same way. I look into the mirror and ask my reflection, “What’s it going to be today? Are you going to just be a passenger in life or are you going to be a captain of your own fate?” The question applies particularly well to how we face hazards as aviation professionals. Are we going to just cope with hazards as we become aware of them, or is there a more comprehensive approach for managing all the hazards that take aim at our operation?

All of us face aviation hazards *actively*. We recognize safety threats when they appear and do something to either avoid or mitigate the hazard. That type of *active safety* is pretty obvious and straight forward. For example, pilots may visually detect a buildup on climbout and opt to make a 20 degree heading change to avoid the buildup.

We use active safety all the time, but it is only one of several dimensions of safety where we can address hazards. After the first accident of the Wright Flyer 103 years ago, we realized that active safety alone was insufficient to fully detect hazards to flights. Relying on rather limited human perception to detect hazards in the highly complex arena of aviation will let us down time after time. The relatively low accident rate of today is greatly the result of investigators who studied mishaps to determine previously unknown or underpublicized hazards and who then proffered recommendations to prevent future mishaps. The world has conducted over a million aviation mishap investigations and has prevented countless new accidents as a direct result of the investigations. Studying accidents to determine previously unknown or, sadly, previously known hazards, is an excellent example of *reactive safety*. The word *reactive* may have a negative connotation amongst some, but it just alludes to the fact that accident investigation reveals hazards after they cause damage or injury. Reactive safety continues being vitally important to accident prevention.

Fifty years ago British Airways pioneered the era of *proactive safety*. Our English friends realized that we don’t have to wait for bad things to happen to detect hidden hazards. By routinely downloading black box flight data, a process known in the U.S. as FOQA, it is possible to add a proactive element to the active and reactive dimensions of flight safety. Proactive safety is particularly insightful when flight data analyses are accompanied by voluntary reporting programs that foster a nuanced understanding of hazards and the sharing of information that would otherwise only be known to a small group of employees. Other examples of proactive safety include

flight observation programs, such as LOSA, and surveys that measure safety cultures at different flight departments. Proactive safety can thus be explained as the uncovering and measurement of hazards that exist but that are either hidden or that merit more attention.

Recently there is talk of a fourth dimension of flight safety. *Predictive safety* is the investigation of potential hazards that don't yet exist, but that might cause damage the very first time they make an appearance. Some air safety investigators believe that predictive safety is a key missing dimension of hazard management. They claim that any successful effort to further lower our accident rate must attempt to attack hazards before they present themselves, in addition to relying on the active, reactive, and proactive dimensions of safety.

An example of predictive safety is addressing potential hazards that may emerge when a flight department starts operating a new type of aircraft. If the flight department is used to operating small aircraft and decides to purchase a larger aircraft, predictive safety may uncover that current snow removal practices at the airport where the aircraft will be based will not provide sufficient wingtip clearance from snowbanks on certain taxiways now that longer wingspans are involved. Such a predictive determination allows the operator to work with the airfield manager to adjust snow clearing procedures prior to the delivery of the new aircraft.

Continuing with our example, let's discuss what could happen without the use of predictive safety. If the crew of the newly purchased aircraft launches on their first wintry departure and stops their taxi due to insufficient wingtip clearance, the hazard is managed through the use of active safety. If the same crew mistakenly taxis their wingtip into the snowbank, perhaps due to poor visibility, then we learn about the hazard through reactive safety. If the same crew notices the growing snowbank during a snow storm and reports that it does not yet pose a hazard but might do so to subsequent users of the taxiway, we are talking about proactive safety.

Many of us operate only in the active dimension of safety. That's a truly important dimension, but it's just one of several. If we want to be captains of our own fate, we need to get a full picture of our operational threats by using active, reactive, proactive, and predictive safety. Captains of fate not only actively search for hazards during each flight, but also study accident reports that relate to their operations, use detection and reporting programs to unmask hidden hazards, and have processes in place to predict hazards that don't yet exist.

I'm eager to hear your thoughts and particularly welcome any examples you have of predictive safety. Email me at antonio.cortes@us.af.mil